

**WHAT IS CLAIMED IS:**

1. An interrogator for a radio identification system having a plurality of tags, selected ones of said tags  
5 operating at a first frequency, and said other tags operating at another frequency, said interrogator comprising:

(a) a first radio frequency module having a transmitter for transmitting an output signal at said  
10 first frequency to said tags, and including a receiver for receiving return signals transmitted by said tags operating at said first frequency;

(b) a second radio frequency module having a transmitter for transmitting an output signal at said  
15 second frequency to the tags, and including a receiver for receiving return signals transmitted by said tags operating at said second frequency;

(c) a controller module coupled to said first and second radio frequency modules, said controller module  
20 including means for controlling said transmitters for transmitting said output signals to said tags, and including decoder means for decoding said return signals received from said tags.

25 2. The interrogator as claimed in claim 1, wherein said means for receiving return signals includes means for dividing said return signals into multiple channels and means for converting said return signals into pulses.

30 3. The interrogator as claimed in claim 2, wherein said decoder means includes synchronization means for synchronizing the frequency of said pulses and means for extracting information from said pulses according to a protocol associated with the tag transmitting the return  
35 signal.

4. The interrogator as claimed in claim 3, wherein said decoder means further includes code checking means for checking said pulses and means for selecting the channel without code violations.

5

5. The interrogator as claimed in claim 1, wherein said first and second radio frequency modules are coupled to said controller through a bus.

10

6. The interrogator as claimed in claim 5, further including a third radio frequency module having a transmitter for transmitting an output signal at a third frequency to the tags, and including a receiver for receiving return signals transmitted by tags operating at said third frequency.

15

20

7. The interrogator as claimed in claim 6, further including a fourth radio frequency module having a transmitter for transmitting an output signal at a fourth frequency to the tags, and including a receiver for receiving return signals transmitted by tags operating at said fourth frequency.

25

8. The interrogator as claimed in claim 7, wherein said first frequency falls in a range 100 to 200 KHz.

9. The interrogator as claimed in claim 8, wherein said second frequency is substantially 13.56 Mhz.

30

10. The interrogator as claimed in claim 9, wherein said third frequency falls in a range 458 to 917 Mhz.

11. The interrogator as claimed in claim 10, wherein said fourth frequency is substantially 2.45 GHz.

35

12. The interrogator as claimed in claim 2, wherein said transmitter comprises an antenna and means for exciting said antenna in response to a control signal from said controller module.

5

13. The interrogator as claimed in claim 12, wherein said means for dividing said return signals into multiple channels comprises a circulator having an input port coupled to said antenna and an output port for each of said channels.

10

14. The interrogator as claimed in claim 13, wherein said means for dividing said return signals into multiple channels includes a mixer and an amplifier for each of said channels, each of said mixers having an input coupled to the respective output port of said circulator and an output coupled to the respective amplifier for said channel, and the output of each of said amplifiers being coupled to said means for converting said return signals into pulses for said channel.

15

20

15. The interrogator as claimed in claim 14, wherein said means for converting said return signals into pulses comprises a pulse shaping circuit for each of said channels.

25

16. The interrogator as claimed in claim 15, wherein said pulse shaping circuit includes an isolated output port coupled to a bus connected to said controller module.

30

17. An interrogator for a radio identification system having a plurality of tags, selected ones of said tags operating at a first frequency, and said other tags operating at another frequency, said interrogator

35

comprising:

(a) a first radio frequency module having a transmitter for transmitting an output signal at said first frequency to said tags, and including a receiver  
5 for receiving return signals transmitted by said tags operating at said first frequency, and said receiver including means for dividing said return signals into multiple channels and means for converting said return signals into pulses;

10 (b) a second radio frequency module having a transmitter for transmitting an output signal at said second frequency to the tags, and including a receiver for receiving return signals transmitted by said tags  
15 operating at said second frequency, and said receiver including means for dividing said return signals into multiple channels and means for converting said return signals into pulses;

(c) a controller module coupled to said first and second radio frequency modules, said controller module  
20 including means for controlling said transmitters for transmitting said output signals to said tags, and including decoder means for decoding said return signals received from said tags, said decoder means including  
25 synchronization means for synchronizing the frequency of said pulses and means for extracting information from said pulses according to a protocol associated with the tag transmitting the return signal, and said decoder means including code checking means for checking said  
30 pulses and means for selecting the channel without code violations.